



## Problem based-learning and life-long learning: Principles, applications, challenges

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## TOULL – Tourism and Life-long Learning

### PROBLEM-BASED LEARNING AND LIFE-LONG LEARNING

Principles, applications, challenges



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 TOULL – Tourism and Life-long Learning  
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## 1 WHAT IS PROBLEM-BASED LEARNING?

Higher education – especially management education in hospitality and tourism – needs to adapt to the developments of the 21st century. To prepare students for their future careers, a new approach to education is required. Universities across the world have adopted problem-based learning as the basis for their education: The Institute for Tourism Management has been working with Problem-Based Learning (PBL) since 2001, and Aalborg University has worked with PBL since 1974, and specially in tourism studies for more than a decade. PBL is a competence-based teaching and learning method. In essence, PBL is “A learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge.” (Barrows & Tamblyn, 1980).

### 1.1 The core elements of Problem-Based Learning

Learning is student-centred - we want the students to take responsibility for their learning. As we cannot “fill in” the knowledge in the minds of students, we are convinced that the learner has to have the ownership of the learning process. For PBL-based universities, lifelong learning is not only a keyword, it is an attitude.

The beginning point for learning should be a problem that the learner wants to resolve. We use real-life problems as the motive and chief focus of student activity. It is important to us to confront the students with the challenges of today's world.

Learning with and from others – collaboration is essential in tourism management and development. PBL offers the possibility to gain active experience with working in teams.

Teachers are facilitators – the role of the teacher is changed: they do not give lectures or tell the students what to do, nor do they tell them whether they are right or wrong. They ask questions, motivate the students to learn, and give feedback to individuals and the collective learning process.

Learning is a reflective process – to develop learning skills it is important to reflect on the individual and the collective learning progress.

#### 1.1.1 Objectives of Problem-Based Learning

PBL pursues various objectives:

- students take responsibility for the learning process
- knowledge is pooled and integrated
- students learn competent use of resources
- students experience, test and subsequently possess a team-based problem-solving method
- students develop the ability to solve real-life problems in the tourism industry
- learning in small groups
- acquiring collaborative and team-learning skills
- acquiring skills necessary to organise their own work process
- students assess themselves and their peers
- meaningful presentation of expertise within time constraints

### 1.1.2 What is different?

Traditional learning model	PBL
Tutor gives answers	Tutor asks questions
First theory – then application	First the problem – then theory
Social and contextual factors are limited	Importance of social and contextual factors
Tutor determines working methodology	Step-wise procedure applied by learners

PBL is an educational approach where the problem comes first. The idea is that the starting point for learning is a problem that the learner wishes to solve. The aim is not simply to solve the problem, but rather to get students to search for the knowledge that they need to handle the problem.

Usually, in education, you are not confronted with a problem until you have acquired the knowledge to solve it. Therefore, many books will provide questions at the end of a chapter. If you properly study the chapter, you should be able to apply this knowledge and answer the questions. However, this process leads to a restricted or passive way of learning.

Short Story: A young boy is playing in the garden and discovers a beetle in the autumn leaves. He goes to his father - a biology professor - and asks him what kind of beetle he has found. The father examines the creature closely and responds: "This is a great find – I don't recognize this type but in my study on the second row of the bookshelf is a book with pictures of many different beetles." The boy goes off to find out what type of beetle it is. After some time, he comes back and says that it must be a 'May beetle'. The father replies: "That's a funny name, why is called a 'May beetle'? Does the book say anything else? And the boy goes off again..... (from a story told by Prof.Dr. Gerald Hüther at the aha Conference 2012)

PBL takes as their point of departure real-world cases. The function of these cases is to challenge students and motivate them to take responsibility for the learning process. They should realise what they already know about the problem and also identify the gap between their knowledge and the knowledge needed to find answers. They should then learn how to find the relevant knowledge and share it with others and start a collaborative learning process.

The PBL approach can be applied in different ways, depending on the institutional context. At the FH Wien PBL is an integrated and highly-structured part of the delivery of courses within the tourism programme. At Aalborg University PBL-style elements can be found in the courses, but its main role can be found in the projects written by groups of students that account for around half of the total time devoted to their study.

The following sections explain both versions of PBL in more detail, starting with the course-oriented Vienna version, and then moving on to the project-based Aalborg version. On the basis of this the final section of the text discusses the challenges of moving towards a PBL approach in universities with other pedagogical traditions, focusing in particular on issues associated with lifelong learning.

## 2 THE PBL COURSE AT THE FHWIEN UNIVERSITY OF APPLIED SCIENCES

The PBL course at FHWien is organised on the basis of the so-called Seven Steps of PBL. This section first describes the seven steps, then defines the key roles of the participants, describes the structure of the PBL course, and finally explains the assessment and

### 2.1 How does it work? – The Seven Steps of PBL

On the one hand, PBL learning outcomes are determined by the learners themselves. On the other hand, the learning process is determined by seven steps. Depending on experience with PBL, the seven steps can either be very strictly followed within set time constraints or, with more experienced PBL groups, they can be adjusted situationally. But most importantly, the starting point is always a problem, typically presented in the form of a text. The problem is characterised by being

- a real-life problem
- adapted for educational purposes
- description of a number of interrelated phenomena or events
- ill-structured and complex
- can be connected to the needs of the learning group
- is attractive to the learning group

The seven steps are outlined in the table below, and then described in more detail in the following text.

Steps	To do	How	Suggested Time
Step 1	Clarify text and terms	Group work	5 minutes
Step 2	Define the problem(s)	Group work – Metaplan	10 minutes
Step 3	Problem analysis	Group work – Brainstorming	20 minutes
Step 4	Inventory of problems and solutions	Group work – discussion	10 minutes
Step 5	Formulate self-study objectives	Group work	5 minutes
Step 6	Self –study	Individual	Self-directed
Step 7	Conclusion, Synthesis	In group	30 minutes

**Step 1: Clarify text and terms**

- deals with questions such as: Which are the difficult phrases or words? Does anyone know what XYZ is?, What do you mean by XYZ?
- aim: each group member should be able to read the material in the same way, providing definitions for any unfamiliar terms which may be obstacles to group work
- process: read out the problem and identify words with an unclear meaning. Prior knowledge of the group should be used or terms can be looked up. If they remain unclear, they then become a learning objective

**Step 2: Define the problem(s)**

- deals with questions such as: What is the real problem here? What are the underlying problem(s)?
- aim: different perspectives, different problem definitions
- requires as much input as possible from group members
- problems need to be formulated in an 'answerable' format
- this is a 'questions-only' step!
- process: individual query with cards

**Step 3: Problem analysis**

- deals with hypothesis: could it be that ... I assume that .... I suspect that ...
- aim: generate hypotheses of causes and mechanisms
- using prior knowledge; possible explanations, answers and/or solutions relevant to the formulated problem(s) should be found
- everyone should contribute to the discussion
- process: try to explain the problem(s) - often takes the form of a 'brainstorming'

**Step 4: Inventory of problems and solutions**

- deals with questions such as: how do the pieces of the puzzle fit together? What pieces are still missing?
- aim: tidy up, list possible explanations, rank hypotheses, eliminate hypotheses, results of the analysis so far are assessed, structure is added to the insights generated in steps 2 and 3, define the limits of knowledge
- process: systematize the ideas with a mindmap

**Step 5: Formulating self-study objectives and set priorities**

- deals with questions such as: what do we need to learn?
- aim: a clear set of objectives for the individual self-study activities, defines what needs to be researched/measured/understood
- provides a clear indication of when to be satisfied with your efforts
- S.M.A.R.T. formulation could be useful here
- add an indication of sources to be used as a starting point
- make sure the set of objectives is complete (i.e. they ensure a solution of the problem in the final step).
- process: list the self-study objectives

**Step 6: Self-study**

- using the set of study objectives, group members work individually
- each student usually sets out to pursue all study objectives
- planning and devising an effective study strategy are important skills here!
- do not lose sight of the main goal!

**Step 7: Conclusion**

- deals with questions such as: What have we learned? Have we found a satisfactory solution to our problem?

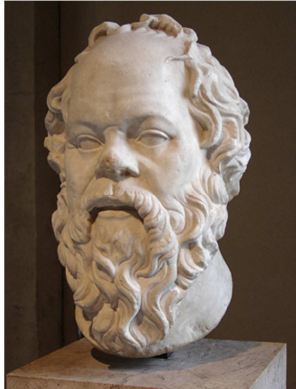


- aim: agreement on explanations/answers found, and on detail and depth of understanding of the related subject matter. If unsatisfied, the group may reformulate further study objectives!
- process: Each member presents his/her findings for each of the study objectives, in-depth questions and explanations, discussing inconsistencies and clarifying confusion

## 2.2 PBL Group Roles

Within the highly-structured PBL environment, the participants perform different roles in order to drive the process forward. The roles are outlined in the table below.

<i>The Student</i>	<ul style="list-style-type: none"> <li>• is responsible for the individual learning process</li> <li>• is responsible for using his/her own resources</li> <li>• is responsible for using the resources of the group</li> <li>• reflects on his/her own behaviour and the group dynamics</li> </ul>
<i>The chair-person</i> <ul style="list-style-type: none"> <li>• is a student</li> <li>• the role rotates every week</li> </ul>	<ul style="list-style-type: none"> <li>• leads and chairs the group (welcomes the participants, plans the agenda, responsible for the timetable)</li> <li>• proposes the methods of working</li> <li>• passes the floor</li> <li>• summarizes the results – visualizes the results</li> <li>• maintains an overview</li> </ul>
<i>The Note-taker</i> <ul style="list-style-type: none"> <li>• is a student</li> <li>• the role rotates every week</li> </ul>	<ul style="list-style-type: none"> <li>• summarizes the content on flip-charts / whiteboards</li> <li>• documents the discussion</li> <li>• maintains eye-contact with the leader</li> <li>• provides a written summary of the group meetings as well as the defined learning objectives and work packages</li> <li>• posts the team reports on the Moodle communication platform</li> </ul>
<i>The observer</i> <ul style="list-style-type: none"> <li>• is a student</li> <li>• the role is optional</li> <li>• the role rotates every week</li> </ul>	<ul style="list-style-type: none"> <li>• observes the process in the group and of each individual person</li> <li>• remains in the background and gives no comments on the content</li> <li>• gives feedback to the group and to each individual team member 10 minutes before each session ends</li> </ul>
<i>Tutor / Facilitator</i>	<ul style="list-style-type: none"> <li>• is responsible for the working atmosphere</li> <li>• is responsible for the structure</li> <li>• lays down rules and regulations</li> <li>• helps to explain new methods of working</li> <li>• asks questions and challenges assumptions</li> <li>• engages in learning activities</li> <li>• motivates / challenges students</li> </ul>

	<ul style="list-style-type: none"> <li>• ensures that the students are 'on track'</li> <li>• does not provide 'mini-lectures'</li> <li>• does not lead the discussions</li> <li>• deals with group dynamics</li> <li>• ensures constructive feedback</li> <li>• provides feedback on the group learning process</li> <li>• provides feedback on the individual learning process</li> <li>• evaluates the results of the learning process</li> </ul>
<i>External Expert from the business world</i>	<ul style="list-style-type: none"> <li>• evaluates the results of the group work</li> <li>• gives feedback</li> </ul>
<i>Organisation</i> <ul style="list-style-type: none"> <li>• the teacher</li> <li>• course administrative staff</li> </ul>	<ul style="list-style-type: none"> <li>• organisation of the schedule and the rooms</li> <li>• organisation of the learning platform</li> </ul>

### 2.3 Structure of PBL course at FHWien

One PBL course consists of seven 90-minute units. Classes are held weekly. Students receive the case study after the introductory workshop via the Moodle learning platform before the second PBL meeting starts.

Students read the case study individually ("confrontation") and compile a personal "micro-article". Each micro-article includes the following three elements:

1. History and Background (Briefly describe the circumstances of the case)
2. Graphical representation (Draw a chart representing the subject matter)
3. Relevant questions (Impulses: Are there any unanswered questions?)

Completed micro-articles must be posted on the platform by 6 pm of the day before the second PBL meeting and must be brought to the second meeting in printed form. The micro-article serves as a basis for content-based study.

In the first meeting, an introductory workshop on PBL is held. The tutor explains the PBL-system, PBL-roles and the concept of moderation and facilitation. The students allocate the roles of chairperson and notetaker.

units	Objective/Content	Method	Tutor
0.0. ex ante	Presentation of PBL; first impressions of PBL	Individual information about PBL: 1. PBL-Film: <a href="http://www.youtube.com/watch?v=gE04TbxQWS8">http://www.youtube.com/watch?v=gE04TbxQWS8</a> <a href="http://www.youtube.com/watch?v=gE04TbxQWS8">http://www.youtube.com/watch?v=gE04TbxQWS8</a> 2. Handout for PBL 3. PBL Moodle Platform	-
1. meeting	PBL presentation; benefit & sense of PBL	Introductory Workshop and Team Building: - What is PBL? - How does it work? - roles in the PBL sessions - moderation tools - principles of feedback - evaluation and assessment - process & organizational matters - rules of cooperation - questions for reflection paper	Input & exercises in small groups with the PBL-tutor
1.1. at home	Case study	Individual work: - read the case study - Micro-article-template	
2. meeting	Observation (1): perceive & describe (step 1 to 5)	Teamwork/moderation: 1. Query with cards to history: collect and arrange on a pin board 2. Common picture on whiteboard 3. Open questions 4. What is the problem? Mindmap 5. Previous knowledge and missing knowledge: Brainstorming 6. Formulate 2 – 3 learning objectives 7. Hints for individual work	Focus: Analysing the problem "Time-out-Joker" for the tutor
2.1. in between	Collect information Individual work ( step 6)	Individual work: Literature and internet research (utilization of theory, models and concepts)	
3. meeting	Observation (2): perceive & describe (step 7 and step 1 to 5)	Teamwork/moderation: 1. Exchange of information: 2 – 3 posters (per learning objective) catchwords, exchange and reconciliation 2. By today´s view: What is the problem? à 2/3 small groups: formulate learning objectives; in a plenum: combining & sorting 3. Tutor: Critical questions (in relation to the learning objectives and the mindmap of session 1.0, point 4) 4. Define the work tasks and organise it in subgroups	Focus: The tutor takes over the role of the devil´s advocate  Analysing the problem "Time-out-Joker" for the tutor  Questions about utility and adequacy of models and past outcome
3.1. in between	Collect information Individual work ( step 6)	Research & elaboration of the learning objectives	
4. meeting	Analysis & Generation of possible solutions	Teamwork/moderation: 1. Presentation of the preparation	

		2. What could the solution look like? Plenum in the whole group; mindmap 3. What is useful in the preparations? What is missing? Brainstorming	
4.1. In between	Collect information Individual work ( step 6)	Work out different aspects for the solution	
5. meeting	Concentration on evaluation & argumentation	Teamwork/moderation: 1. Presentation of the preparations on a flipchart (done by the note-taker) 2. Reality check & argumentation "role play"; students take over the role of the company representative: critical questions from the viewpoint of the company representative – group gives reasons: Is it acceptable, useful?	Focus: Critical questions
5.1. in between	Development of the solution Small groups	Individual and group work	
6. meeting	Decision and realization	Teamwork/moderation: 1. Argumentation and Structure of the solution on flipchart within the group 2. Presentation – who & how 3. Preparation of the presentation	Focus: Critical questions
6.1. In between	Preparation of the presentation Small groups  Individual work: Reflection paper	Finalization of the presentation Creation of the PPP Send the solution paper to TM@fh-wien.ac.at + Upload on Moodle; one day before presentation at the latest! Reflection paper Tutor gives the questions at the beginning of PBL Send the reflection paper via e-mail to the tutor; one day before presentation at the latest!	Individual feedback
7. meeting	Presentation and discussion with a company representative	Presentation of the solution Discussion with a company representative	Moderator
8. meeting	Feedback of the process	Reflection within the group on - the whole process - the lessons learned	Feedback and moderation

## 2.4 Assessment

Grades are awarded according to the Austrian system of assessment (1 to 5, with 1 being the highest and 5 representing a fail).

There is a compulsory attendance requirement for PBL courses. If attendance is below 75 % of the course or if their PBL course grade is negative, the student has to hand in a written compensation work of about 10 pages. The topic is provided by the tutor.

The tutor continually assesses the students:

### a) Quality of work

- well formulated Micro-article
- quality of individual work
- student delivers individual work on time
- quality of the reflection paper
- student makes creative and reflective contributions

### b) Interaction within the group / dealing with differences & conflicts:

- student participates in class
- student recognises and understands his/her strengths and weaknesses
- student listens actively to colleagues and joins in discussions
- student contributes to a climate of trust and supports others
- student shows the ability to reflect on his/her own behavior
- student shows the ability to reflect on the group process

## 2.5 Reflection

In order to improve the capacity of participants to benefit from future PBL courses, students are encouraged to reflect on the following questions after the first PBL course:

- What have I observed / experienced?
- What have I learned/realized/will I change?
- What role did I take within the group?

Similarly, after the second PBL course students are encouraged to reflect on the following questions:

- What have I learned methodically?
- What / who over the course of the work process most developed me? And how?
- What / who over the course of the work process most hindered me? And how?
- What have I learned in relation to the group or my behavior in groups?
- Projects for other PBL groups

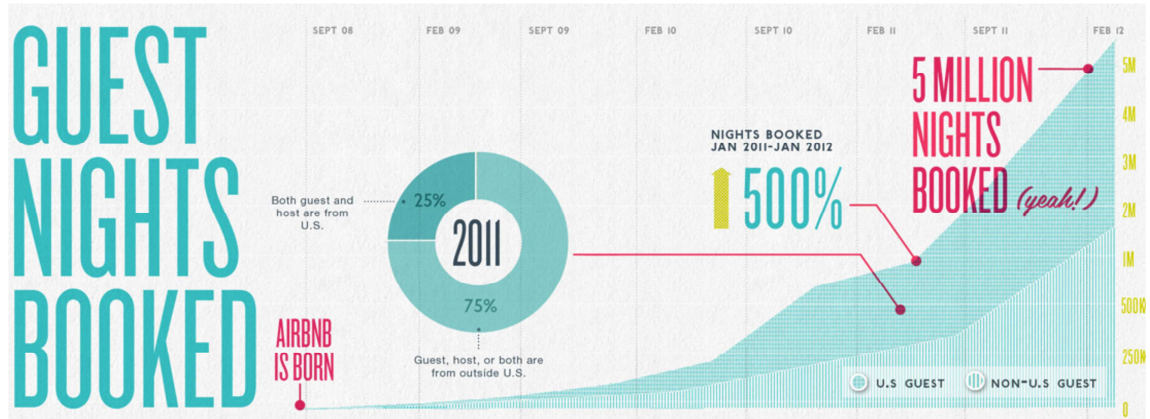
Finally, for students with more experience in PBL activities, the following questions need to be reflected on:

- How would I assess my contribution to the solution of the case studies within the team? (quantitatively in %, qualitatively descriptive)
- How would I characterize my personal development areas / strengths in teamwork?
- What were the differences between case one and two? Name the criteria at the level of group/ process / course / person / atmosphere etc.
- What is the central conflict of this group? How does this conflict manifest itself?
- What are the strengths / areas of learning of this group?

## 2.6 PBL Cases Examples

### 2.6.1 Air bnb – find a place to stay

Mag. Rainer Ribing, Managing Director of the Federal Economic Chamber Sector Tourism and Leisure, is looking at this diagram:



He observes the growing activities of private accommodation skeptically. As a representative of the hotel industry, he asks himself: "How large is this market actually already in Austria? What about the legal aspects? How can the official hotel industry react? This development is to be taken very seriously, and we should find answers quickly!"

Homepage: <https://www.airbnb.at/>

Film: <https://www.airbnb.at/home/press>

In cooperation with:



### 2.6.2 Business Model with a Future

On 30th October, 2011: Mag. (FH) Martin Schaffer, Managing Director of Kohl & Partner Wien, reads this news item:

"Health tourism plays a major role in Bavaria and translates to 40 billion euros per year. The growth rates are 2 to 3 percent annually. The share of gross domestic product is around 10 percent. In the future, more and more wealthy Russians and Indians will fill hotel beds in Bavaria."

Alexander Sergeyevich Pushkin, an entrepreneur from Russia, suffered a stroke in October. Since then he is no longer able to walk, suffers from double vision and speech difficulties. Rehabilitation is urgently needed and he requires physical and speech therapy. Furthermore, his doctor has prescribed plenty of rest (the entrepreneur used to work 7/365 for his company.) Alexander wants to have the best possible care and decided not to be treated in Russia as he is being forced to keep his distance from his business activities. There are some countries in Europe that have an excellent reputation for their healthcare provision. Money is no object in his recovery and he wants his wife and three daughters to be by his side during his treatment. In addition, they should be able to enjoy a relaxing holiday while Alexander is being treated.

In cooperation with:





### 3 PBL-BASED PROJECT WRITING AT AALBORG UNIVERSITY

At Aalborg University PBL-style elements can be found in the courses in form of case-studies used as part of the pedagogics of teaching e.g. tourism marketing, but its main role can be found in the projects written by groups of students that account for around half of the total time devoted to their study. Here students define their own problems and work under the supervision of staff in order to develop the best possible project report on the topic of their choice.

#### 3.1 The process of project writing

##### 3.1.1 Project beginnings

When the study courses are well under way, students are encouraged to think about topics for projects and form working groups around this. The starting point is mostly a combination of two factors

- a shared interest in particular aspects of courses students are attending
- a real-life problem that puzzles students (e.g. a marketing campaign, new forms of tourist behaviour, lack of innovation in a destination)

##### 3.1.2 Defining the problem

Students groups are assigned a supervisor who takes on the role of dialogue partner for the duration of the project period, typically two months from beginning to hand-in of the written text. The first task of the project group is to become clearer about what the problem is, similar to going through steps 2-4 in the Wien model. This is typically done through brainstorming discussions and results in a draft introduction to the project, setting out

- what the problem is perceived to be
- why this is relevant in relation to the academic literature and the tourism industry
- (sometimes even) what possible solutions to the problem may be

This text is discussed with the supervisor and revised, often more than once.

- Is 'curious', seeks to explore a 'problem' (not aimed simply at describing or giving an account of a phenomenon)
- Is original (rather than copying what has been done before).
- Is academic (as opposed to commonsensical, non-theoretical)
- Is relevant
- Is properly contextualised
- Has a clear focus
- Is written in precise language, formulated in a few lines
- Is an open question (not calling for a simple 'yes' or 'no' answer)
- Is possible to answer
- Is properly reflecting what is actually in the project report and, eventually, the conclusion.

The table above (from Thomsen & Zhukova Klausen, 2012, p. 6) sets out some important criteria for students to judge what a good problem formulation could be.

### 3.1.3 Planning project work

Having defined the problem at the core of the project, the next steps are to develop a strategy to illuminate it. This involves three types of considerations (similar to steps 5-6 in the Wien model):

- to identify a conceptual/theoretical framing suitable for the problem at hand, and agreeable to the participating students
- to develop a method through which the problem can be illuminated (what data should be collected, and how)
- searching for studies of similar problems in the academic literature



This is a phase where reading and discussions between students about what they have read take up a lot of time. Looking at the existing literature often provides positive or negative inspiration for both conceptualisation and methods, because students identify strengths and weaknesses of what has been done in similar situation – and become aware of how their case is different from what has been studied so far. But students also bring to the project their knowledge from previous courses and projects: concepts they have felt worked well, methods they feel competent about, and so this is still a creative phase of the project.

The role of the supervisor is to respond to ideas of students and provide concrete comments on draft sections of the project, not to provide ready-made cook-book solutions. Ready-made solutions would also be difficult to apply to individually designed projects with unique problem formulations, so the role of the supervisor is primarily to provide Socratic dialogue and questioning, rather than knowing all the answers.

### **3.1.4 Illuminating the problem**

Midway in the project process, attention will turn to illuminating the problem, something which involves two types of activities:

- gathering data on the basis of the chosen methods in order to improve the understanding of the problem: text, interviews, photos, official reports, business accounts, ...
- analyse the data on the basis of the conceptual framework identified as most suitable for the problem

This phase is typically characterised by increasing time pressure, as students become increasingly aware of the deadline for handing in the finished project report.

The role of the supervisor is primarily to comment on draft sections of the analysis in a detailed and constructive manner.

### **3.1.5 Finalising the project report**

The last couple of weeks students will spend on bringing together and editing the project into a coherent text, bearing in mind formal requirements about style, formatting etc. The role of the supervisor is here primarily to read drafts, specially of concluding sections, to comment on the coherence of the argument put forward.

<b>Introduction</b>	Purpose, problem formulation: - What is the problem that this project seeks to explore? - Why is this a relevant/topical/interesting problem?
<b>Method</b>	Method(s) of analysis/approach: - How will you approach and explore this problem? - Why did you choose this particular research design (incl. particular kinds of sources/data)?
<b>Theory</b>	Presentation and critical discussion of theories relevant to the identified problem.
<b>Analysis</b>	Critical use/discussion of data and sources. Make sure to apply theory actively in your analysis.  You may choose to include discussion in your analysis or separate these into different chapters.
<b>Conclusion</b>	Summary of findings, answering questions posed in the introduction.
<b>List of references</b>	Works cited.

The table above (from Thomsen & Zhukova Klausen, 2012, p. 4) sets out the sections typically found in project reports, and the function they have in relation to addressing the problem.

### 3.1.6 Assessment

Assessment of written projects takes the form of an oral exam where students present and discuss their work with two assessors: their supervisor on the one hand, and an academic colleague or graduate practitioner on the other hand. The students get individual marks, but these relate to the text and the oral performance, not the preceding process of writing the text. Marks reflect the degree to which academic standards are met, but discussions will also revolve around the practical implications of the work in terms of development of tourism activities.

Students also have the possibility of assessing the supervision process, so that all parties involved are prompted to reflect on what might be improved next time around.

## 4 PBL CHALLENGES

In an ideal world where learning is the only thing that matters for everyone, PBL would be widespread throughout the education system. In the world we live in, PBL to some extent challenges existing traditions, practices, and world views. In order to progress PBL, a series of issues need to be borne in mind and addressed:

- If *students* have grown up in an educational culture where they are the passive recipients of the wisdom of teachers, then taking active responsibility for their own learning will be difficult. This suggests that it is important to
  - structure PBL activities so that students start by following a script (e.g. the seven steps) so that expectations are made explicit and clear
  - persevere in the face of student reluctance, on the expectation that once they experience added learning benefits, they will appreciate the new approach
- If *teachers* have worked in an environment where knowing about the substance of the field of specialism was central, then becoming a process manager and dialogue partner for students could be difficult. This suggests that it is important to
  - ensure structured training for teachers so that they feel more comfortable with their new role
  - to have ongoing dialogues with colleagues to ensure that experiences, good or bad, are shared
- PBL needs to be integrated in the *curriculum* of the study programmes, otherwise students and teachers may see it as result of the individual whims of teachers or something extra that are only for particularly interested ones
- Before starting PBL projects it is important to inform the students about the process, the advantages and the challenges of PBL.
- *Resources* need to be made available for PBL activities. It is more difficult to motivate teachers to supervise, if these activities are not seen as part of their workload by the department/university. And it is more difficult for students to engage in PBL activities, if facilities in terms of meeting rooms and library resources are insufficient.
- *External networking* with industry partners is crucial for the success of PBL activities, because it helps provide a ready flow of problems and issues to deal with for the students, and also helps convincing them that PBL is not just good for their learning, but also for their future career.
- It is useful to reflect on the learning process on an ongoing basis and at the end of the project.

All in all, for departments and universities, PBL is an investment in the future. But, speaking on the basis of experience from Vienna, Aalborg, and many other PBL-oriented institutions around the world – it is an investment in better education that pays off for students and universities alike.

## 5 LINKS

### 5.1 Problem-Based Learning Networks

<http://edineb.org/> (Educational Innovation in Economics and Business)

<http://www.ucpbl.net/> (Aalborg University)

<http://www.facilitate.ie/> (A PBL Network)

<http://feedback.bton.ac.uk/pbl/pbldirectory/index.php> (PBL Directory)

<http://ctlit.ubc.ca/programs/communities-of-practice/problem-based-learning-network/>  
British Columbia

<http://pbln.imsa.edu/> (The Illinois Mathematics and Science Academy (IMSA))

### 5.2 Problem-Based Learning Examples

<http://www.siumed.edu/dme/> (Problem Based Learning Initiative-Southern Illinois University School of Medicine)

<http://www.udel.edu/inst/> (University of Delaware)

[http://www.hku.hk/speech/pbl/Guided\\_Tour/guidedtour.htm](http://www.hku.hk/speech/pbl/Guided_Tour/guidedtour.htm) (University of Hong Kong)

<http://www.materials.qmul.ac.uk/pbl/> (Queen Mary, University of London)

[http://www.en.aau.dk/About+Aalborg+University/The+Aalborg+model+for+problem+based+learning+\(PBL\)/](http://www.en.aau.dk/About+Aalborg+University/The+Aalborg+model+for+problem+based+learning+(PBL)/) (Aalborg University official PBL guide)

### 5.3 PBL in Life-Long Learning Examples

<http://coventryuniversity.podbean.com/2007/06/25/problem-based-learning-maggi-savin-baden/> (Coventry, UK)

<http://fhs.mcmaster.ca/globalhealthoffice/video.html> (West Indies)

[www.wifi.at/lernen](http://www.wifi.at/lernen) (WIFI, Austria)

### 5.4 Journal

<http://docs.lib.purdue.edu/ijpbl/> (The Interdisciplinary Journal of Problem-based Learning)

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